

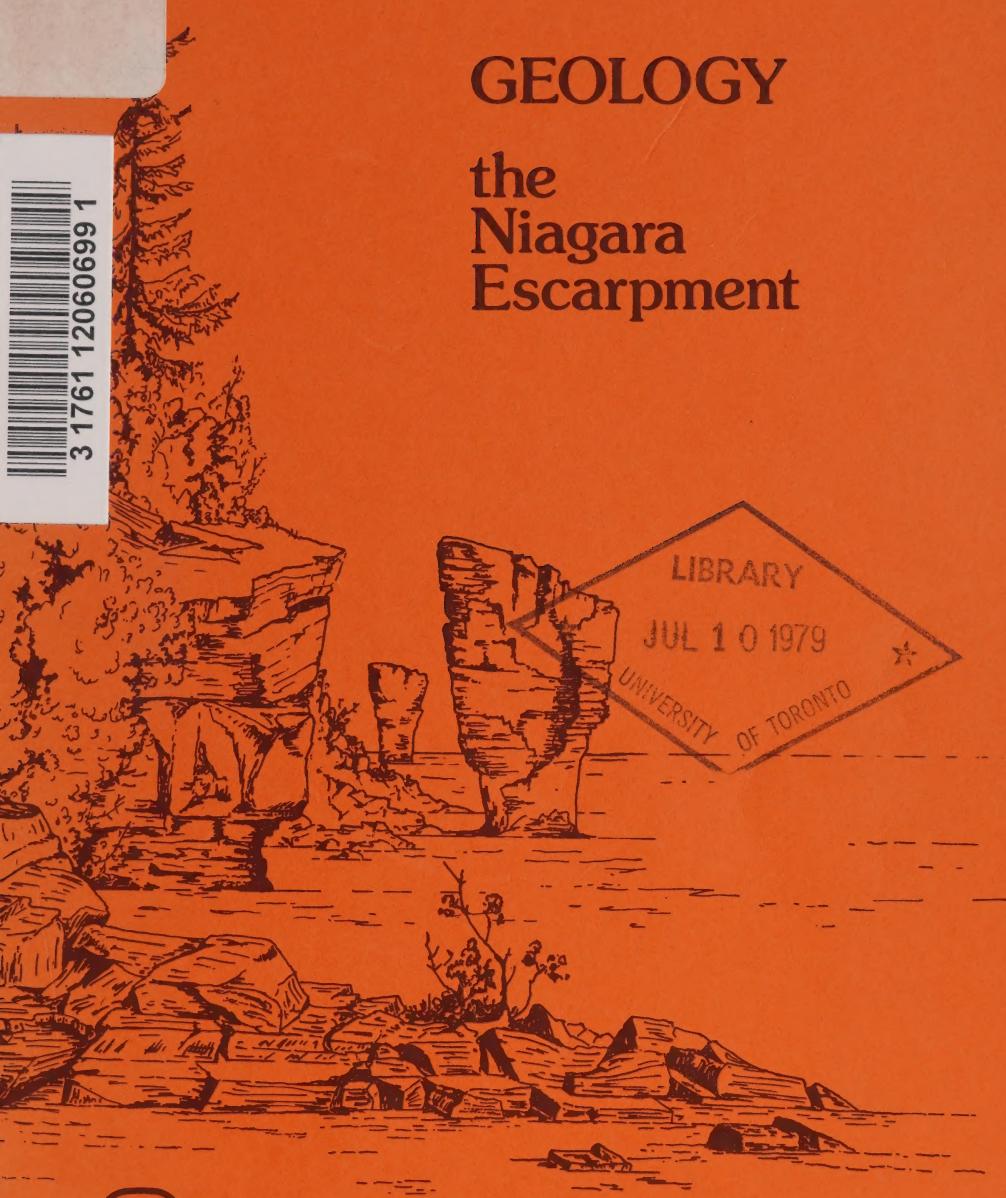
CARON
TR 80
- 2003

ONTARIO UF

Government
Publications

GEOLOGY

the Niagara Escarpment



Ontario
Niagara
Escarpment
Commission

Spring 1979

The Niagara Escarpment

The Niagara Escarpment is recognized as one of the world's unique natural wonders.

Location

Essentially, it is a landform—a ridge of rock several hundred feet high in some locations—stretching 725 kilometres (450 miles) from Queenston on the Niagara River to Tobermory at the tip of the Bruce Peninsula. It contains a rich mosaic of forests, farms, recreational areas, wildlife habitats, dramatic scenic views, cliffs, hills, waterfalls, mineral resources, historic and archaeological sites, industrial sites, populated urban centres, villages and hamlets.

Today, in Ontario, the Escarpment contains more than 100 sites of geological significance including some of the best exposures of rocks and fossils of the Silurian and Ordovician Periods (405 to 500 million years old) to be found anywhere in the world.

E Escarpment natural areas contain more than 300 species of birds, 53 species of mammals, 36 species of reptiles and amphibians, 90 fish species, and 100 varieties of "special interest flora" including 37 types of wild orchids.

How do we preserve such uniqueness?

This is the basic task of the 17-member Niagara Escarpment Commission—to produce a plan which will maintain the Escarpment and land in its vicinity substantially as a continuous natural environment while at the same time allowing compatible development to proceed wherever possible.



**Ivor McMullin,
Chairman,
Niagara Escarpment Commission**

Geological History

Project:

The Niagara Escarpment is a massive topographic feature with origins dating back into geological history some 430-450 million years, a time when the area lay under a shallow warm sea. This sea lay in a depression of the earth's crust, the centre of which is now the State of Michigan. Now geologically known as the Michigan Basin, the outer rim of this massive saucer-shaped feature governs the location of the Niagara Escarpment.

Location

In the shape of a gigantic horseshoe the Escarpment can be traced from near Rochester, New York, south of Lake Ontario to Hamilton, north to Tobermory on the Bruce Peninsula, beneath the waters of Lake Huron to appear again on Manitoulin Island, across northern Michigan and down the west side of Lake Michigan into the State of Wisconsin.

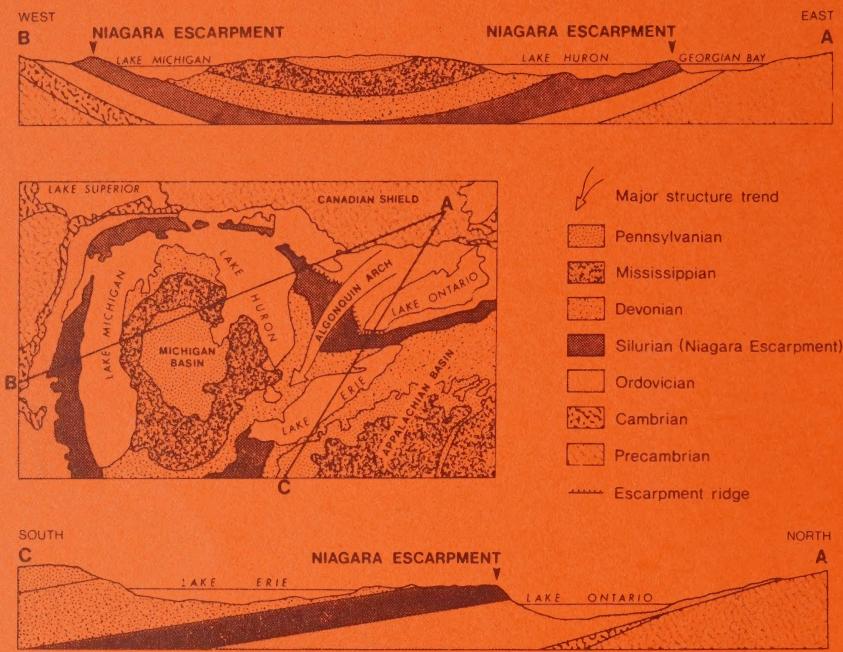
Geology

As occurs with present day water bodies such as Hudson Bay or the Gulf of Mexico, rivers flowing into this ancient sea carried sand, silt and clay to be deposited as thick layers of sediment. At the same time lime-rich organic material from the abundant sea life was also accumulating. Over millions of years these materials became compressed into massive layers of sedimentary rocks and ancient reef structures now visible along the Escarpment. Some rock layers now consist of soft shales and sandstones while others are made up of dolostone (a rock similar to limestone which contains magnesium and is more durable).

Today, fossil remains illustrating the various life forms can be found in many of the rocks as they are slowly exposed by the action of wind, water and ice. The Niagara Escarpment is a geologist's paradise and contains some of the best exposures of rocks and fossils of the Paleozoic Era found anywhere in the world.

The Location and Structure of the Niagara Escarpment

After: Tovell, 1965



As a landform, the Escarpment began to form only after the ancient sea withdrew some 300 million years ago.

Over succeeding millions of years erosive agents slowly removed the softer shales underlying the more resistant dolostone layers.

As the softer underlying material was eroded away, large blocks of the resistant dolostone caprock broke off creating the vertical face of the present day Escarpment.

Though of preglacial origin, the Escarpment face has been dramatically altered by successive advances of Pleistocene ice sheets over the last one to two million years.

The erosive power of the glaciers can be observed in several places—such as the widening and deepening of the Beaver Valley or the numerous rock fragments and boulders carried miles from the Escarpment and deposited in massive moraines.

This mass of material deposited by the ice and ensuing meltwater, covering the rock as much as several hundred feet in places, was even more important in modifying the appearance of the Escarpment. Glaciation, therefore, has made it very difficult for an observer to determine the exact location of the Escarpment in areas such as Mono Township and Caledon – a factor which has caused considerable debate between landowners and the Commission members as to what lands in the area constitute the Escarpment!

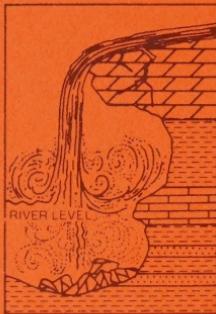
Weathering and erosive forces that initially carved the Niagara Escarpment are the same ones still occurring today. These include running water, waves, frost action, ice and wind.

Running water and waves have created the most dramatic results. The effect of the wave action is well illustrated along the shores of Georgian Bay in the Bruce Peninsula, while the erosive force of running water is best displayed in the Niagara Gorge, which has been carved by the Niagara River over approximately the last 13,000 years following glaciation.

Erosion at the headwaters of the numerous streams rising on the Escarpment is largely responsible for the many indentations and irregular appearance of the Escarpment face. Outliers, or segments of the Escarpment separated from the main face, such as at Milton or Glen Williams, are also the result of stream erosion.

The Sapping Process

After Tovell, 1965



HARD DOLOMITE
SOFT SHALE
LIMESTONE
SHALE
SANDSTONE
SHALE
SANDSTONE
SHALE

The Niagara Escarpment Commission

Less obvious, but important, is the chemical weathering process whereby the porous dolostones are dissolved, creating karst features such as sink holes and caves and leading to numerous springs along the base of the Escarpment. Good examples of sink holes can be found on the west side of the Beaver Valley near Wodehouse, and at St. Edmunds Cave at the top of the Bruce Peninsula.

Also, frost action is continually loosening large blocks of rock from the face creating a talus slope below.

The Niagara Escarpment thus continues to slowly change by the same process that led to its creation.

Other places along the Escarpment containing interesting, prominent geological features accessible to the public (and of high scenic value) can be found at:

- Ball's Falls conservation area near Vineland in the Niagara Peninsula
- Decew Falls owned by Ontario Hydro near St. Catharines
- Devil's Punch Bowl conservation area near Stoney Creek
- Webster's Falls and Tew's Falls in the Spencer Gorge conservation area north of Dundas
- Mount Nemo, north of Burlington
- Hilton Falls conservation area near Milton
- historic Cataract Falls north of the Forks of the Credit River, near Caledon
- Mono Cliffs provincial park north of Mono Centre
- Devil's Glen provincial park east of Singhampton
- the Blue Mountain caves near Collingwood
- "Old Baldy" near Kimberley in Grey County
- Eugenia Falls conservation area in the Beaver Valley, north of Flesherton
- Inglis Falls conservation area south of Owen Sound
- Pottawatomi (Jones' Falls) conservation area west of Owen Sound
- Indian Falls conservation area north of Owen Sound
- Cyprus Lake provincial park near Tobermory
- Lion's Head and Cabot Head on the Bruce Peninsula
- Rocky Bay and Cave Point (with sea caves) accessible only by boat between Cabot Head and Tobermory.

This pamphlet produced by
the Niagara Escarpment Commission
Information Office, 232 Guelph St.,
Georgetown, Ont. L7G 4B1
Phone (416) 877-5191

NIAGARA ESCARPMENT - GEOLOGICAL FEATURES

